PEŠTAN
we build trust

ARMO

Armored to provide pure quality

PAS 1075 type 3

The pipes for transporting water with pressure

ARMO

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We have additionally reinforced the existing PE 100 RC pipes with a protective layer, thereby expanding the polyethylene pipe family with a new member called ARMO.

ARMO pipes represent the latest generation of development of polyethylene solutions.

ARMO pipes are intended for alternative pipeline installation methods and are manufactured in accordance with PAS 1075, Type 3 standard.

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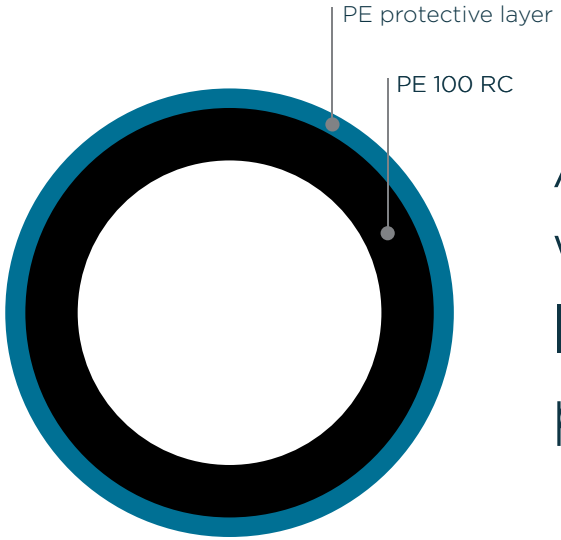
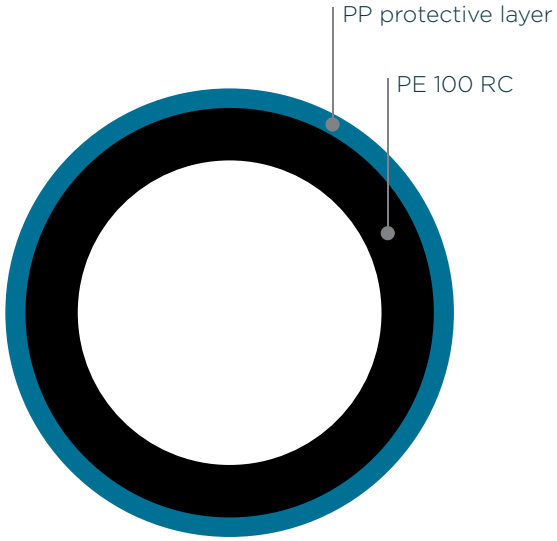
TYPES OF PIPES

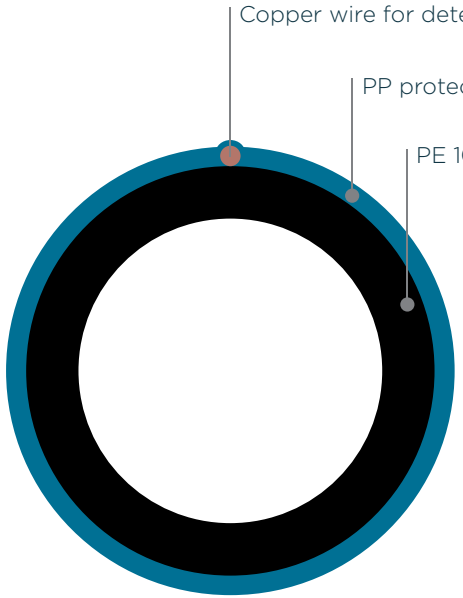
ARMO is a double-walled tube made of innovative, highly robust PE 100 RC plastic with an extra protective layer made of polyethylene or polypropylene. This tube provides increased safety and longer life compared to traditional PE pipes, even when it comes to extreme loads such as pipe notches, grooves and point loads.

Pipes are with dimensionally added protective outer sheath of polyethylene or polypropylene. ARMO tubes, as required by ISO 4065 for tubes with an outer protective layer, consist of a core tube of one-layer PE-100-RC standard dimension and a protective sheath of polypropylene or polyethylene. The minimum thickness of the sheath shall be 0.8 mm. The thickness of the sheath depends on the dimension of the pipe. Large pipes have a thicker liner due to the larger loads the pipes are designed for.



Armo tubes with protective layer of polyethylene





Armo tubes with protective layer of polypropylene

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ADVANTAGES

ARMO pipes have high reliability and proven performance thanks to the materials they are made of, which makes them an excellent choice, especially for pipe systems intended for civil engineering projects.

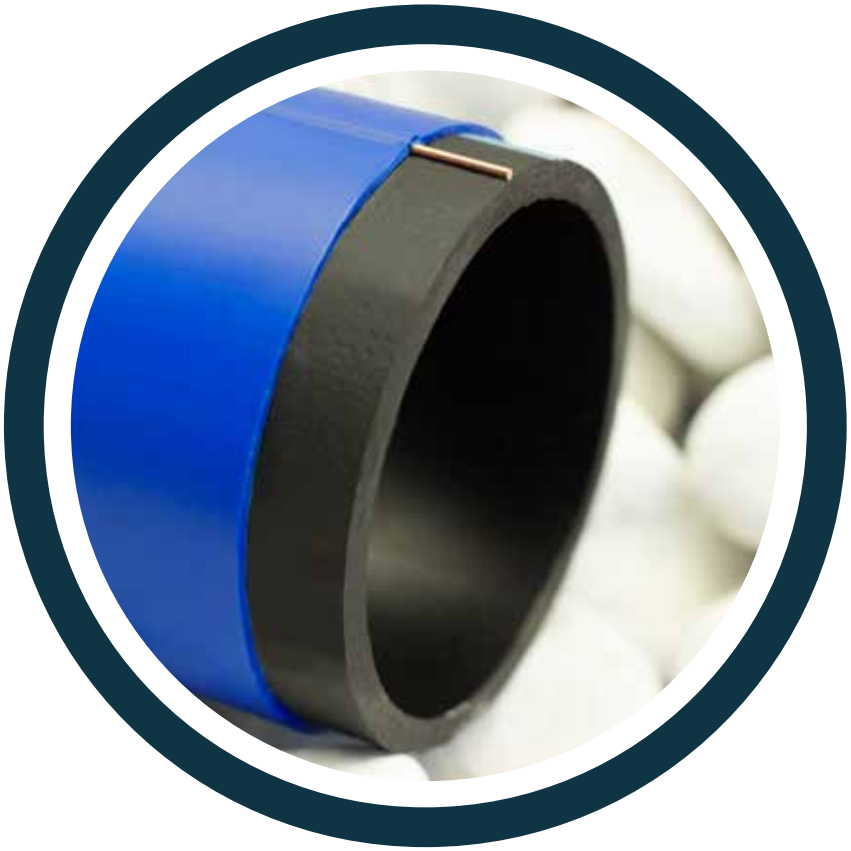
Due to their high stretchability, toughness and elasticity, PESTAN ARMO pipes do not cause problems during installation and operation at low temperatures.

High resistance to hydraulic shock, fatigue and wear eliminates the need for higher nominal pressures and reduces the value of the investment.

Comparisons have shown that polyethylene pipes have a higher abrasion resistance than other materials, making PE the most desirable material for pipe transport of solutes.

Excellent hydraulic characteristics (low absolute roughness) - Smooth surface and resistance to turbulent fluid flow allow for greater flow and give excellent hydraulic characteristics to ARMO pipes.

ARMO pipes are resistant to a large number of chemical agents.



ARMO pipe look without protective layer

Due to their good weldability and elasticity, long length PE pipelines can be connected outside the trench and then laid (which reduces the required trench width) and the welds will be strong and reliable. A wide range of PE pipe fitting methods offer installers numerous installation solutions that can provide significant time and cost savings, for example PE pipes are preferred for trenchless or narrow trench installations.

TECHNIQUES OF INSTALLATION

The methods used to incorporate ARMO tubes may be unconventional because of their reinforced structure over “ordinary” HDPE tubes.

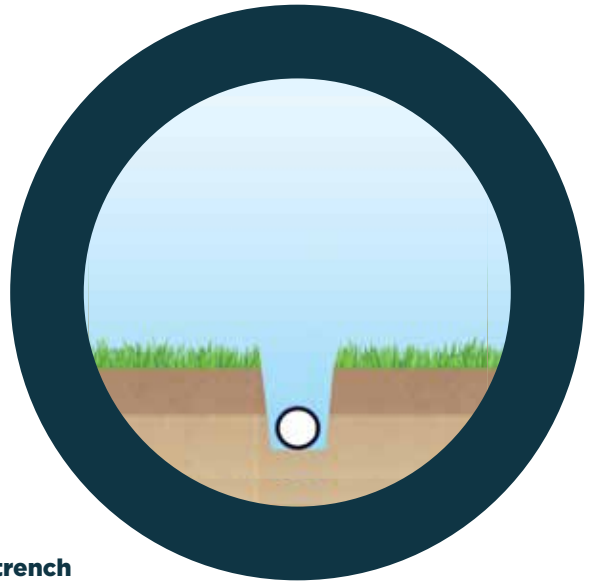
The minimum allowed temperature for welding and installing ARMO pipes is 5°C.

Laying in narrow trenches

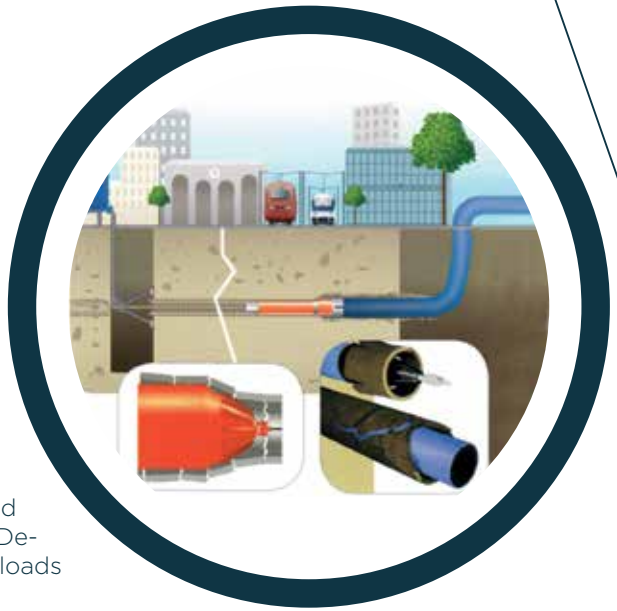
This is a modification of the classic pipe laying in a trench. Using short or long trenches, trenches that are 100 mm wider than the laying pipe are dug. Piped or pre-welded pipelines are laid in this trench. Significant savings can be achieved with a much smaller volume of excavation, less imported material (sand for bedding) and reduced work.

Pipe bursting

This is an increasingly popular method for the rehabilitation of existing pipelines, where excavation is unacceptable. With pipe bursting, the existing pipe is destroyed and the new ARMO pipe is retracted into the resulting hole, providing replacement with the same pipe diameter, or with the help of a destroyer, the pipe diameter can be increased relative to the replaced pipe. Today’s bursting hydraulic tools are capable of destroying both pipes and fittings, if the situation so requires, and with further tool adaptation even ductile and steel pipes can be destroyed.



Pipe laying in narrow trench



Pipe bursting *

This method is technically demanding and requires skilled personnel and appropriate equipment. Depending on the material and condition of the old pipe, scratches and cuts may occur on the new pipe. Debris and stones cause concentrated loads during exploitation.

Moling

Moling has become a commonly used non-excavation method for smaller diameter pipe fitting, and can provide significant savings over excavation pipe fitting. Excavation is done only for entry and exit pits, so moling is ideal for underpasses and expensive sidewalks or sidewalks, gardens and gardens where excavation would disrupt land and plants. The moling tool is a percussion tool with a pneumatic motor, which drills a hole (tunnel) and in most cases pulls a new PE tube. Experienced contractors are required to perform this installation technique so as not to exceed the permissible stresses of a pre-welded pipeline or coil when drawn.

Plowing

A technique developed on the basis of agro-cultural techniques for laying and drainage. This method is used for laying water and gas pipes on the tracks between settlements.

Directional drilling

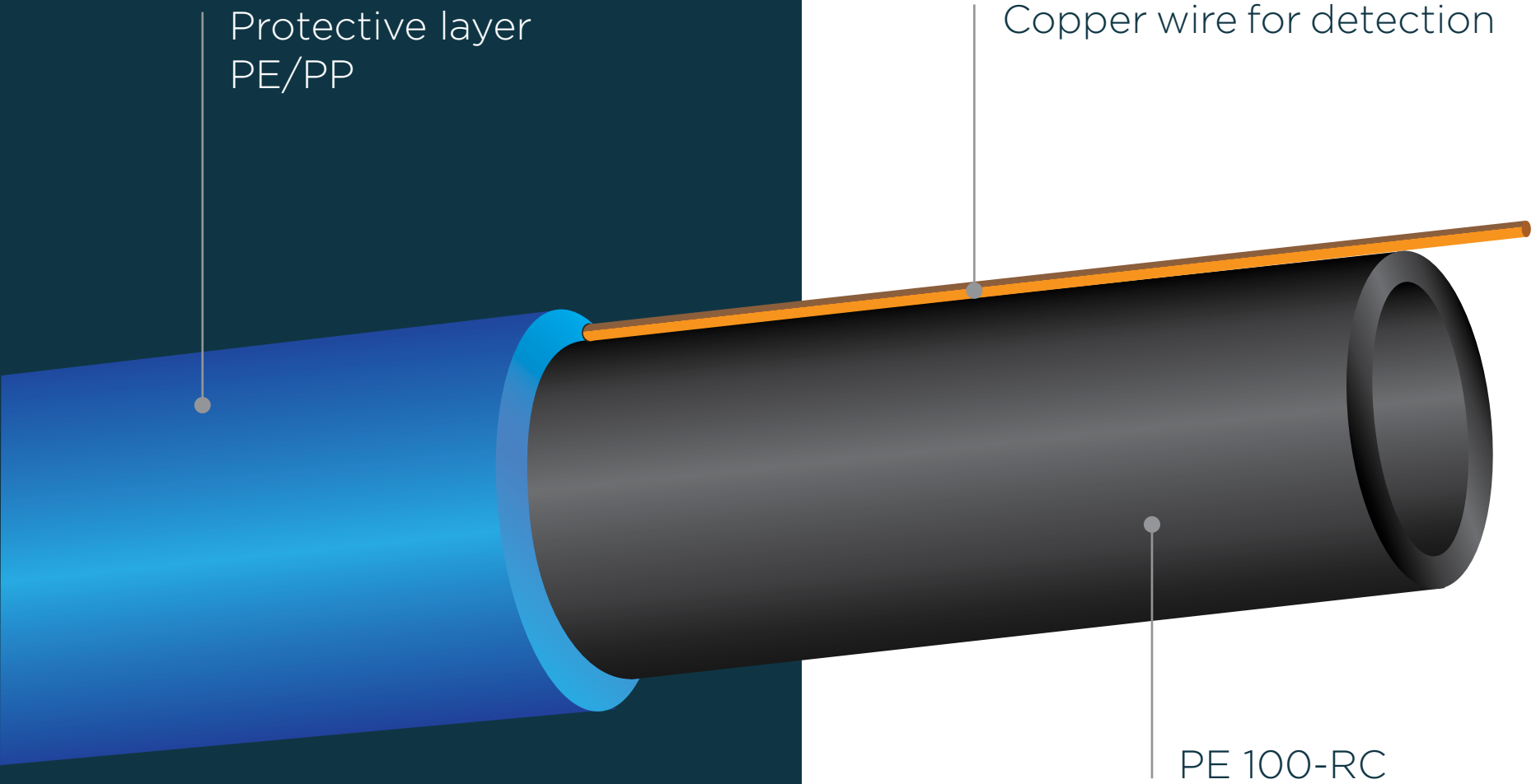
This technique also became a conventional one and is used as an installation method for polyethylene pipes and is used for underpasses, railways and rivers, in places where excavation is difficult, expensive or impossible.

Slip-lining

Inserting smaller diameter ARMO pipes, slip-lining, into an existing pipeline is one of many techniques without excavation for rehabilitation - rehabilitation of old pipelines. With slip-lining a reduction in pipe diameter is inevitable, though this can be reduced to a minimum by thoroughly cleaning the old pipeline and choosing the largest possible pipe diameter for insertion. The smaller diameter is offset by the improved hydraulic performance of polyethylene, and in some cases we even have the higher throughput of the new pipeline.

PIPE DETECTION

For the detection of the ARMO pipeline, the simplest and most economical method is to place in the trench a tube containing in its structure a marker, a copper wire for monitoring - detection. A marker wire is placed between the center and outer layers of the pipe.


Protective layer
PE/PP
Copper wire for detection
PE 100-RC

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PIPE CONNECTION

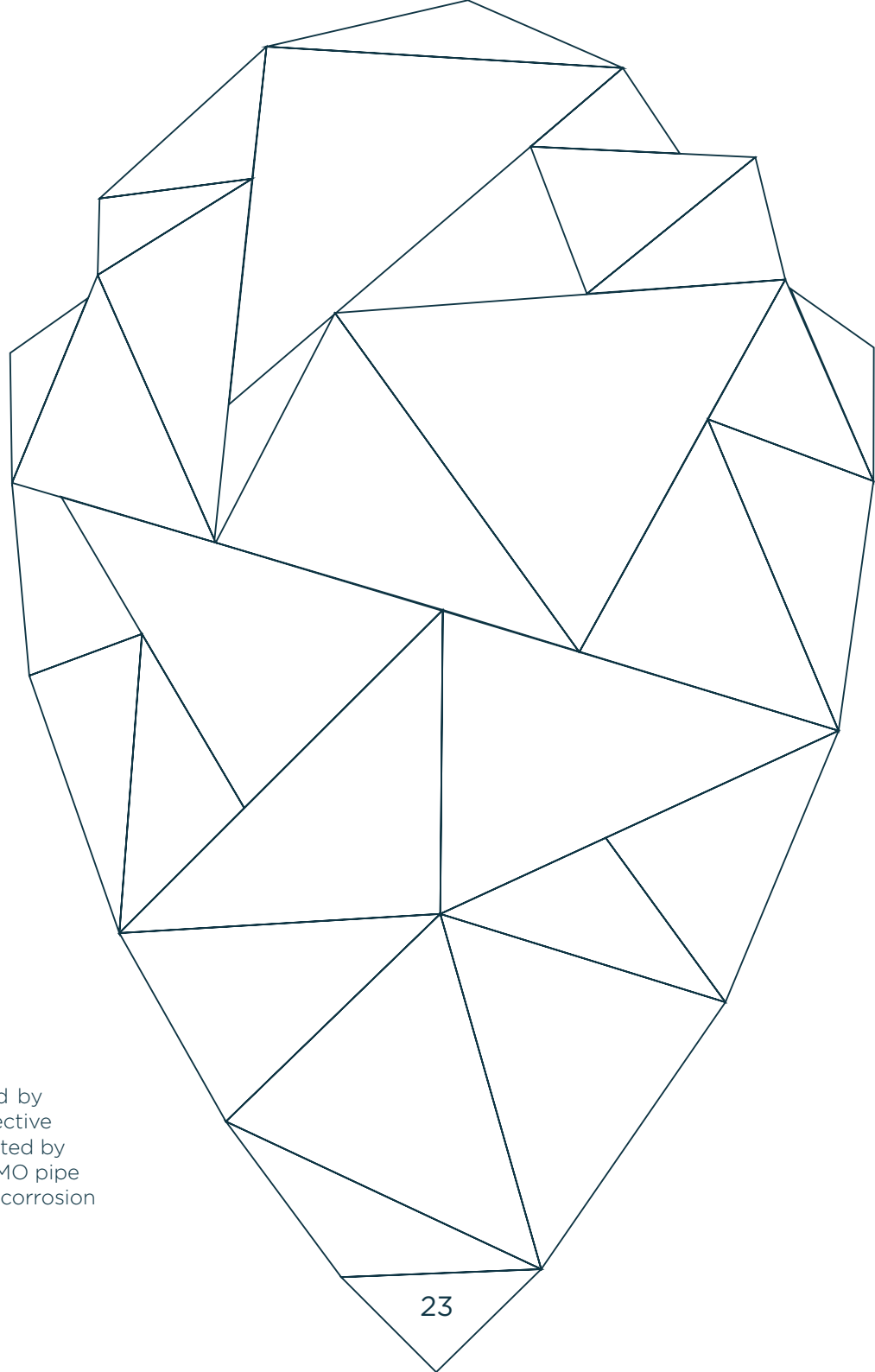
These pipes can be connected with conventional welding (like other PE pipes), with the difference to pay attention if the pipes have copper wire in their structure. Pipes and fittings can be connected by welding the ends with standard techniques for joining PE pipes. Pestan ARMO pipes are compatible with the fittings of leading manufacturers and do not require special material for installation which is their biggest advantage. Joining methods of ARMO tubes are electrofusion welding, butt welding, and mechanical joining. During electrofusion pipe welding, it is mandatory to remove the protective layer, whether made of PE or PP. The minimum length of removal of an additional protective layer from PP or PE, for a given pipe diameter, should be according to the dimensions shown in the table 1.

ARMO pipes are compatible with fusion welding connectors of all worldwide leader manufacturers.

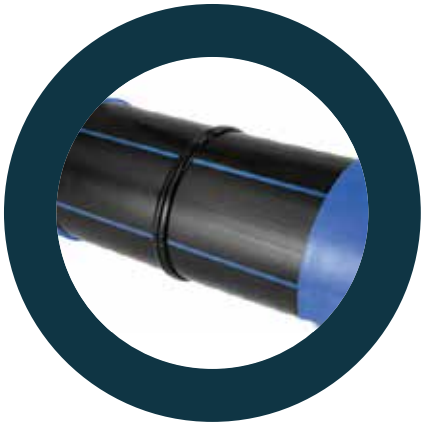
*table No 1

DN [mm]	Length of removal of the protective layer
110	90
125	95
140	105
160	110
180	115
200	120
225	125
250	135
280	150
315	160
355	160
400	170
450	180
500	190
560	200
630	220

If ARMO pipes, which have an integrated copper wire for detection, are connected by electro-fusion, the copper wire must be moved to the side after removal of the protective layer, until the pipes are connected and then the ends of the copper wire are connected by an electric coupler. After that, it is imperative to protect the junction point of the ARMO pipe with a heat-shrink film and / or a butyl rubber-based self-bonding strip (to prevent corrosion and electrical insulation on pipes and metal parts).

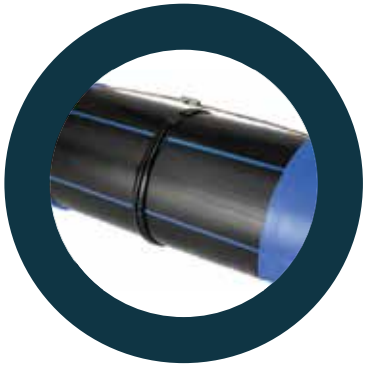


The butt welding of the pipes without copper wire for detection is done in the following steps:

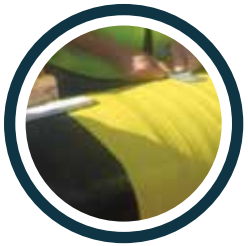


- If the **outer layer is made of polyethylene,** the welding is carried out without removing of the protective layer.
- If the **outer layer is polypropylene,** it is necessary to peel the outer layer according to Table 1 and connect the pipes. Finally, the junction point of the ARMO pipe is insulated with a heat shrink film and / or butyl rubber based self-adhesive tape.

The butt welding of the tube with the copper wire for detection is done in the following steps:



- Peel the outer PP layer of the pipe in accordance with Table 1 with care not to damage the copper wire and the middle layer.
- Move copper wire to the side (usually "pulled" backwards) and the middle layer will be bonded with the butt welding machine. After that, the two ends of the copper wire are connected by an electrical connector.



- Finally, the junction point of the ARMO middle layer and the copper wire junction is insulated with a heat shrink film and / or butyl rubber based self-adhesive tape (to prevent corrosion and electrical insulation on pipes and metal parts).

DN [mm]	SDR 41	SDR 33	SDR 26	SDR 21	SDR 17	SDR 13.6	SDR 11	SDR 9	SDR 7.4	SDR 6
	PN 4	PN 5	PN 6	PN 8	PN 10	PN 12.5	PN 16	PN 20	PN 25	PN 32
	e_{min} [mm]	e_{min} [mm]	e_{min} [mm]	e_{min} [mm]	e_{min} [mm]	e_{min} [mm]	e_{min} [mm]	e_{min} [mm]	e_{min} [mm]	e_{min} [mm]
110			4.2 + APL*	5.3 + APL*	6.6 + APL*	8.1 + APL*	10.0 + APL*	12.3 + APL*	15.1 + APL*	18.3 + APL*
125			4.8 + APL*	6.0 + APL*	7.4 + APL*	9.2 + APL*	11.4 + APL*	14.0 + APL*	17.1 + APL*	20.8 + APL*
140			5.4 + APL*	6.7 + APL*	8.3 + APL*	10.3 + APL*	12.7 + APL*	15.7 + APL*	19.2 + APL*	23.3 + APL*
160			6.2 + APL*	7.7 + APL*	9.5 + APL*	11.8 + APL*	14.6 + APL*	17.9 + APL*	21.9 + APL*	26.6 + APL*
180			6.9 + APL*	8.6 + APL*	10.7 + APL*	13.3 + APL*	16.4 + APL*	20.1 + APL*	24.6 + APL*	29.9 + APL*
200			7.7 + APL*	9.6 + APL*	11.9 + APL*	14.7 + APL*	18.2 + APL*	22.4 + APL*	27.4 + APL*	33.2 + APL*
225			8.6 + APL*	10.8 + APL*	13.4 + APL*	16.6 + APL*	20.5 + APL*	25.2 + APL*	30.8 + APL*	37.4 + APL*
250			9.6 + APL*	11.9 + APL*	14.8 + APL*	18.4 + APL*	22.7 + APL*	27.9 + APL*	34.2 + APL*	41.5 + APL*
280			10.7 + APL*	13.4 + APL*	16.6 + APL*	20.6 + APL*	25.4 + APL*	31.3 + APL*	38.3 + APL*	46.5 + APL*
315	7.7 + APL*	9.7 + APL*	12.1 + APL*	15.0 + APL*	18.7 + APL*	23.2 + APL*	28.6 + APL*	35.2 + APL*	43.1 + APL*	52.3 + APL*
355	8.7 + APL*	10.9 + APL*	13.6 + APL*	16.9 + APL*	21.1 + APL*	26.1 + APL*	32.2 + APL*	39.7 + APL*	48.5 + APL*	59.0 + APL*
400	9.8 + APL*	12.3 + APL*	15.3 + APL*	19.1 + APL*	23.7 + APL*	29.4 + APL*	36.3 + APL*	44.7 + APL*	54.7 + APL*	66.5 + APL*
450	11.0 + APL*	13.8 + APL*	17.2 + APL*	21.5 + APL*	26.7 + APL*	33.1 + APL*	40.9 + APL*		61.5 + APL*	
500	12.3 + APL*	15.3 + APL*	19.1 + APL*	23.9 + APL*	29.7 + APL*	36.8 + APL*	45.4 + APL*			
560	13.7 + APL*	17.2 + APL*	21.4 + APL*	26.7 + APL*	33.2 + APL*	41.2 + APL*	50.8 + APL*			
630	15.4 + APL*	19.3 + APL*	24.1 + APL*	30.0 + APL*	37.4 + APL*	46.3 + APL*	57.2 + APL*			

*** APL - additional protective layer** (PP / PE), minimum 0.8 mm, depending on pipe dimensions, conditions of application and type of the project.

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